Magnetic properties of quantum spin liquid candidate $PrMgAl_{11}O_{19}$

S. Kumar,[1,2] M. Klicpera,[1] A. Eliáš,[1] M. Kratochvílová,[1] R. H. Colman,[1] M. Śliwińska-Bartkowiak,[2] and G. Bastien[1]

[1] *Charles University, Faculty of Mathematics and Physics, Department of Condensed Matter Physics, Prague, Czech Republic*

[2] *Adam Mickiewicz University, Faculty of Physics, Department of Dielectric Physics, Poznan, Poland*

The frustrated magnets have caused an abiding fascination in recent decades due to the large variety of competing ground states. While some of these states are magnetically ordered, magnetically disordered states of different natures have also been predicted and reported, such as quantum spin liquid (QSL). Among them, the QSL states attract much attention due to the occurrence of quantum entanglement of spins without any long-range magnetic order down to zero temperature. In this work, we focus on one of the simplest case of geometrical magnetic frustration: the triangular lattice antiferromagnet (TLAF). It is a quasi-two dimensional magnet with magnetic ions forming a triangular lattice and antiferromagnetic interactions along the three sides of triangles. Recently the realization of a quantum spin liquid has been proposed in the TLAF $PrZnAl_{11}O_{19}$ based on specific heat, neutron scattering and muon spectroscopy on polycrystalline samples [1]. We succeeded to grow single crystals of the similar compound $PrMgAl_{11}O_{19}$ [2] by the floating zone method. We are characterizing the magnetic properties of single crystal $PrMgAl_{11}O_{19}$ by magnetization, and specific heat measurements.

References:

[1] M. Ashtar, X.Y. Gao, C.L. Wang, Y. Qiu, W. Tong, Y. M. Zou, X. W. Zhang, M. A. Marwat, S. L. Yuan, Z. M. Tian, Journal of Alloys and Compounds, **Synthesis, structure and magnetic properties of rare-earth $REMgAl_{11}O_{19}$ (RE = Pr, Nd) compounds with two-dimensional triangular lattice**, Volume 802, 25 September 2019

[2] H. Bu, M. Ashtar, T. Shikora, H. C. Walker, Z. Fu, J. Zhao, J. S. Gardner, G. Chen, Z. Tian, H. Guo, X.Y. Gao, Physicsal Review B, **Gapless triangular-lattice spin-liquid candidate $PrZnAl_{11}O_{19}$**, Volume 106, 24 October 2022